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APPALACHIAN FOREST EXPERIMENT STATION

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SPROUT DEVELOPMENT ON ONCE-BURNED AND REPEATEDLY-BURNED AREAS IN THE SOUTHERN APPALACHIANS

By

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Foresters have long known that southern Appalachian hardwoods sprout quickly following fire and that abundant sprout growth persists in areas that have burned repeatedly. These facts are readily apparent from observation and are supported by many fire-effects studies in relation to forest succession, growth, soil, and wild life. The study described here verifies the sprouting tenacity of southern Appalachian hardwoods and provides additional data on the character of stand to be expected after one severe spring fire and after several successive fires.

Sprouting capacity was measured on a series of plots[1/] in a young sprout hardwood stand originating after a forest fire that occurred about 25 years prior to the start of the study. Oaks predominated in the upper crown classes with dogwood, sourwood, and black gum forming an understory. A few large shortleaf and pitch pine trees are also found in the area. Trees ranged from 2 to 16 inches in diameter, but 95 percent of the trees were less than 6 inches in diameter.

In April 1934, two plots, each approximately 3 acres in size, were burned over by a severe fire. One of the two areas was reburned in April of 1938 and 1940. On the once-burned and thrice-burned plots, maximum and average height of sprouts, crown diameter of sprout clumps, and number of sprouts were tallied in the fall of 1937, 1939, and 1941 following, respectively, the 4th, 6th, and 8th growing seasons since the first burn. The 1934 spring burn was more severe than the average fire and killed about 85 percent of the trees. The 1938 fire on the repeatedly-burned

1/Bent Creek Experimental Forest, near Asheville, N. C.

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plot was also intense but the 1940 burn was of moderate severity. Both of the latter fires killed back nearly all sprouts.

SUMMARY OF RESULTS

The highlights of this study are summarized below. Detailed data of number and size of sprouts and sprout clumps are given in Table 1.

Table 1.--Number and size of sprouts and sprout clumps on once-burned and thrice-burned plots.

Average for all hardwood species	Once-burned			Thrice-burned	
	No. of growing seasons since 1st burn				
	4th season	6th season	8th season	6th season	8th season
Percentage of trees with sprouts.	92	87	83	93	93
No. of sprouts per acre.....	6,140	4,240	2,920	11,990	10,240
No. of sprouts per clump.....	6.1	4.6	3.3	11.3	9.7
Height of tallest sprout (feet)..	6.9	8.2	10.4	5.4	5.2
Diameter of clump crowns (feet)..	4.1	6.1	6.4	4.6	4.3
Percentage of ground area occupied.....	34	63	68	41	36

Sprouts on the once-burned area totaled more than 2,900 per acre 8 years after burning with an average height, for the tallest sprout in each clump, of 10.4 feet. Dominance is already being expressed in this area and the weaker trees are dying. The fine stand of sprouts, nearly 85 percent oak, occupied more than two-thirds of the ground area at the 8th season after burning. The 890 sprout clumps per acre and the few trees surviving the fire will develop into a good stand of timber if continuous fire protection is successful.

Sprouting capacity was not reduced by three successive fires. No marked evidence exists to show that growth rate or vigor have been

decreased by successive burning. Although sprout growth had to begin anew after each successive fire, the average maximum height 2 years after the third fire (1940) was 5.2 feet compared with 5.4 feet of growth for the 2 years following the 1938 fire.

Sprouting activity increased as parent tree diameter increased up to 5 inches d.b.h., but as parent tree diameter increased beyond 6 inches, sprouting activity decreased. These data support the general observation that sprouting is more prolific following fire in a stand of small trees than in a pole- or sawlog-size stand.

Consistent but not great differences in the number of sprouts were found among four principal species of oak. Scarlet and white oaks had 6 to 7 sprouts per clump, whereas post and black oaks had only 5 to 6 at the end of 4 years following the first fire. Two years following each of the repeated fires, scarlet and white oaks had 10 to 15 sprouts and post and black oaks 7 to 10. At the end of the 6th and 8th growing seasons the differences had largely disappeared on the once-burned plot. Sprouting characteristics of other tree species did not differ significantly from those of the oaks.

Post oak sprout clumps consistently were narrower than those of other species, and scarlet and black oak clumps averaged tallest and broadest.

The shortness and limited lateral crown spread of the sprouts for the first few years following fire resulted in an undesirable exposure of the soil. Two-thirds of the repeatedly-burned area is not protected by sprout crowns. Repeated fires have also reduced the shrub cover so that danger of soil deterioration exists. There is evidence of compacting, sun-baking, depletion of organic matter, and on steeper ground washing may occur. The extent of soil deterioration has not yet been determined.

Forest managers concerned with food supplies for game will be interested in the effect of repeated burning on the abundance of legumes noted, respectively, by Stoddard[2/] and Ruff[3/] to be of considerable importance as a food for quail and deer. An abundance of legumes is present on the thrice-burned area, a few on the once-burned plot, and almost none in the unburned forest nearby.

2/Stoddard, H. L. The bobwhite quail; its habits, preservation, and increase. 559 pp. C. Scribner's Sons, New York. 1936.

3/Ruff, Frederick J. The white-tailed deer of the Pisgah national game reserve. 249 pp. (Mimeo.) 1938.